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EXAMINER	
BASOM, BLAINE T	
ART UNIT	**PAPER NUMBER**
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/866,859	LIEBERMAN ET AL.	
	Examiner	Art Unit	
	Blaine Basom	2173	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 September 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22,24-34,36-38,41-43,46-56,58-63,66-68,71-73 and 76-85* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22,24-34,36-38,41-43,46-56,58-63,66-68,71-73 and 76-84* is/are rejected.

7)☒ Claim(s) *85* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 May 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

The Examiner acknowledges the Applicants' addition of new claims 81-85. Regarding claim 1, inter alia, the Applicants argue that Montellese (U.S. Patent No. 6,281,878), described in the previous Office Action, fail to teach a two dimensional sensor comprising a single lens. The Examiner respectfully disagrees, for the reasons previously asserted in the Advisory Action, mailed 4/19/2005. The Applicants, briefly, provide various arguments as to why the references cited in the previous Office Action are not combinable and various arguments as to why these references fail to teach the claimed features. These arguments are essentially a repeat of previous arguments submitted by the Applicant, and accordingly, the Examiner respectfully disagrees with these arguments, due to the reasons presented in the previous Office Action mailed 12/16/2004, and in the Advisory Action mailed 4/19/2005.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 7, 11, 12, 23-25, 32, 33, 49, 51-54, 57-60, 79, and 80 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,281,878, which is attributed to

Montellese (and hereafter referred to as "Montellese"). In general, Montellese discusses devices for inputting data and commands into computer systems, such as small electronic devices, whereby the input devices are not susceptible to failure caused by particulate matter (see column 1, lines 23-67). Montellese particularly proposes presenting the user with an image of an input device, and using a light sensor to detect the user's interaction with the image, in order to determine the user's intended input (for example, see column 2, lines 2-22).

Regarding claims 1 and 49, Montellese particularly teaches associating a small electronic device with a projector, which projects an image of an input device, such as a keyboard, onto an inert surface adjacent to the electronic device (see column 3, lines 22-61). The electronic device may also be associated with one or more two-dimensional electronic sensors, and an infrared illuminator, which are for sensing user indicator interaction with specific locations on the projected input device image (see column 3, line 61 – column 4, line 35). In addition, Montellese discloses that circuitry may be provided at the output of the sensors, to determine the user's intended input, which is provided to the small electronic device (see column 4, lines 35-52). It is understood that, if the input device is a keyboard, such input to the electronic device may comprise alpha-numeric information, and may be displayed on a display of the small electronic device. Consequently, a small electronic device, and its associated projector, sensors, and circuitry, operating as described by Montellese, is considered an apparatus like recited in claim 1, and is understood to teach a method like recited in claim 49.

As per claims 7 and 51, Montellese discloses that the above-described illuminator, referred to as a "light source," may be operative to direct infrared radiation over the projected image of the input device, whereby the sensors may comprise an infrared sensor to sense the

infrared radiation reflected, i.e. scattered, from the user indicator as it interacts with the projected image (see column 3, line 61 – column 4, line 35; and column 4, line 66 – column 5, line 22).

As per claim 52, Montellese discloses that the above-described illuminator, referred to as a "light source," may be operative to also direct visible radiation over the projected image of the input device, whereby the sensors may comprise a sensor to sense the visible radiation reflected, i.e. scattered, from the user indicator as it interacts with the projected image (see column 3, line 61 – column 4, line 35; and column 4, line 66 – column 5, line 22).

Concerning claims 11-12 and 53-54, Montellese discloses that the above-described user indicator, which interacts with the projected image of an input device, may be the user's finger, or may be a pencil or pen, i.e. a hand held stylus (see column 8, lines 39-45).

Referring to claims 23-24 and 57-58, Montellese discloses that the above-described sensor may comprise an array of discrete sensing elements, each represented by a pixel (see column 5, lines 22-54). Such an array, which detects the user indicator as it is positioned approximate the sensor, is considered a "position sensitive detector" like recited in claim 24. In addition, Montellese discloses that such an array of sensing elements is of the type found in video cameras (see column 5, lines 22-28), which as known in the art, require a lens operative to image a region onto the array of sensing elements. It is consequently understood that the sensor of Montellese comprises at least one lens operative to image a region overlying the input device image onto a corresponding element in the array of discrete sensing elements.

In regard to claims 25 and 59-60, Montellese discloses that the illuminator, referred to as a "light source," may be positioned to direct infrared and/or visible radiation at a plurality of levels above the image of the input device, and that a sensor may be operative to sense the

infrared and/or visible light reflected, i.e. scattered, from the user indicator at a plurality of locations therealong (see column 3, lines 61-66; and column 5, line 65 – column 6, line 22). Montellese discloses that this may be done to detect the relative distance to the user indicator. Regarding claims 32-33 and 79-80, Montellese discloses that, in addition to a keyboard, the above-described projector may also project an image of a "pointer" input device, such as a mouse (for example, see column 3, lines 27-49; and column 7, lines 8-13). Additionally, Montellese discloses that a single two dimensional sensor, comprising an infrared illuminator, may be used to sense user indicator interaction with specific locations on the image of the input device (for example, see column 5, line 65 – column 6, line 46). In such a case, the projector is considered to project an image of a keyboard and of mouse functionality onto a surface, whereby a single two dimensional sensor comprising an infrared illuminator senses user indicator interaction with specific locations of the image of mouse functionality. Montellese further discloses that circuitry may be provided at the output of the sensor, to determine the user's intended input, information of which is provided to the small electronic device (see column 4, lines 35-52). It is understood that, if the input device image is a mouse, such input to the electronic device may comprise cursor control information. Consequently, Montellese is understood to teach an apparatus like that recited in claims 32-33, and a method like that recited in claims 79-80.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2-6, 8-10, 13, 16-22, 26-29, 36, 41, 46, 50, 55-56, 61, 66, 71, and 76 are rejected under 35 U.S.C. 103(a) as being unpatentable over the U.S. Patent of Montellese, which is described above, and also over U.S. Patent No. 6,614,422, which is attributed to Rafii et al. (and which is hereafter referred to as "Rafii"). As described above, Montellese describes an apparatus and method like that of claims 1 and 49, respectively, for entering alpha-numeric information into a computer. Such an apparatus and method particularly entails implementing a projector for projecting an image of an input device, such as a keyboard, onto a surface; implementing a two dimensional sensor with an infrared illuminator for sensing user interaction with the image; and implementing information generation circuitry for a providing alpha-numeric output corresponding to the sensed user interaction, as is described above. Although Montellese discloses that such an apparatus and method may be implemented with an "electronic device, such as a portable computer or a personal organizer" (see column 2, lines 1-14, for example), Montellese fails to provide a comprehensive list of all the electronic devices in which the method and apparatus may be implemented. Montellese thus fails to explicitly disclose that the method and apparatus may be implemented with a wireless communicator, such as a cellular telephone, as is required in claims 2-4, 8-10, 26-28, 36-38, 41-43, 46-48, 50, 66-68, 71-73, and 76-78, or that the method and apparatus may be implemented with a personal digital assistant, as is

required by claims 5-6. Similarly, Montellese fails to describe in specific detail the particulars of the projector or of the sensor, and thus fails to explicitly disclose the features of claims 13-22, 29-31, and 61.

Like Montellese, Rafii discusses methods and apparatuses for inputting data and commands into electronic devices, particularly by configuring such devices to project an image of a keyboard to be used to enter data into the device (see column 1, line 20 – column 2, line 20; and column 4, lines 7-33). The electronic device of Rafii thus comprises: a projector, like that of Montellese, which is for projecting an image of at least part of a keyboard onto an inert surface in front of the electronic device (see column 4, lines 7-33; and column 10, lines 41-56); a sensor comprising an infrared illuminator, like that of Montellese, which is for sensing user interaction with specific locations of the keyboard image (for example, see column 4, lines 7-33; column 5, lines 39-53; column 9, lines 11-20; and column 10, lines 27-40); and alpha-numeric information generation circuitry at the output of the sensor, for providing alpha numeric output to a display (see column 6, lines 42-58; and column 8, lines 45-63). The illuminators and projectors of Rafii are considered analogous to the illuminators and projectors of Montellese, as they possess the same functionality.

Consequently, it would have been obvious to one of ordinary skill in the art, having the teachings of Montellese and Rafii before him at the time the invention was made, to modify the methods and apparatuses taught by Montellese such that they may also be implemented with the electronic devices taught by Rafii. It would have been advantageous to one of ordinary skill to utilize such a combination, because as taught by Rafii and more fully shown below, there exists a plurality of devices which would benefit from input devices like those of Montellese. The

methods and apparatuses of Montellese would thus be implemented on a larger range of devices, and would consequently be more utilized. Additionally, it would have been obvious to one of ordinary skill in the art, having the teachings of Montellese and Rafii before him at the time the invention was made, to modify the projectors and illuminators taught by Montellese such that they are implemented like those of Rafii, which are more fully described below. It would have been advantageous to one of ordinary skill to utilize such a combination, because Rafii presents projectors and illuminators which may be effectively used with small electronic devices, whereas Montellese doesn't explicitly describe such projectors and illuminators.

As per claims 2-4 and 50, Rafii discloses that the electronic device may be a wireless communicator, specifically a cellular telephone, which is operable to provide alpha-numeric output, such as e-mail, to a receiver (see column 8, lines 25-33; and column 8, lines 45-49). It is therefore understood that such a cellular telephone comprises a housing, in which is mounted a projector, a sensor system, and alpha-numeric generation circuitry in order to implement the above-described projected keyboard (for example, see column 4, lines 7-33; column 5, lines 39-53; and column 6, lines 42-58).

In reference to claims 5 and 6, Rafii discloses that the above-described electronic device may be a personal digital assistant (PDA) (see column 8, lines 25-33; and column 8, lines 45-49). It is therefore understood that such a PDA comprises a housing, in which is mounted a projector, a sensor system, and alpha-numeric generation circuitry like described above (for example, see column 4, lines 7-33; column 5, lines 39-53; and column 6, lines 42-58).

As per claim 8, Montellese discloses that the above-described illuminator, referred to as a "light source," may be operative to direct infrared radiation over the projected image of the input

device, whereby the sensors may comprise an infrared sensor to sense the infrared radiation reflected, i.e. scattered, from the user indicator as it interacts with the projected image (see column 3, line 61 – column 4, line 35; and column 4, line 66 – column 5, line 22).

As per claims 9-10, Montellese discloses that the above-described illuminator, referred to as a "light source," may be operative to also direct visible radiation over the projected image of the input device, whereby the sensors may comprise a sensor to sense the visible radiation reflected, i.e. scattered, from the user indicator as it interacts with the projected image (see column 3, line 61 – column 4, line 35; and column 4, line 66 – column 5, line 22).

As per claims 13, 16-18, 29, and 61, Rafii discloses that the projector used to project a keyboard image may comprise a point light source, such as a laser, which illuminates a lens with a diffractive pattern delineating a keyboard etched on it (see column 10, lines 41-56). The lens thus serves as a mask defining the image of the keyboard, and therefore, Rafii teaches that the projector comprises a point light source illuminating a mask defining the image of the keyboard. By this reasoning, the projector is considered to comprise a diffractive optical element, specifically this lens having a diffractive pattern, which when illuminated produces the keyboard image on an inert surface. As shown in figure 1A, when projected onto an inert surface, the keyboard appears non-distorted even though the projector does not directly (e.g. at a 90° angle) point to the surface. Such an angle of incident would normally create a distorted keyboard image. Thus it is understood that, to create such a non-distorted image given the angle of projection, the mask of Rafii is formed to define a distorted representation of the keyboard image in order to compensate for distortions in the projector. In addition, Montellese discloses that the projected keyboard image may dynamically change (for example, see column 3, lines 27-49).

Consequently, it is understood that the mask of Rafii, as used to create such a dynamically changing image, is necessarily a dynamically changeable mask.

With respect to claims 19-22 and 55-56, and particularly regarding the infrared and visible light illuminators recited in these claims, Rafii discloses that an illuminator, referred to as a "light source," may be implemented with either a laser or an LED (for example, see column 10, line 57 – column 11, line 2). Montellese similarly states that such a light source may be implemented as a laser, and used to project infrared and/or visible light (see column 3, lines 61-66). Such a laser, implemented as an illuminator, is therefore considered a "point source," like that recited in the claimed invention. Rafii further teaches that the light from such a point source passes through a lens, like lens 288' in figure 3, and is radially directed to optically *cover* the projected keyboard (see column 13, lines 40-46; and note the light rays 140 in figures 1A and 1B, as are described in column 10, lines 27-34). Thus light emitted from the point light source is radially directed from the point source, and is projected onto a flat surface. Consequently, the infra-red and/or visible light illuminator taught by Rafii and Montellese is understood to comprise a "cylindrical reflecting element" like that recited in each of claims 19-22 and 55-56, which is for reflecting light from a point source and producing a generally flat, generally radially-directed light distribution.

In regard to claims 26-28, Montellese discloses that the illuminator, referred to as a "light source," may be positioned to direct infrared and/or visible radiation at a plurality of levels above the image of the input device, and that a sensor may be operative to sense the infrared and/or visible light reflected, i.e. scattered, from the user indicator at a plurality of locations therealong

(see column 3, lines 61-66; and column 5, line 65 – column 6, line 22). Montellese discloses that this may be done to detect the relative distance to the user indicator.

Regarding claims 36 and 66, Rafii discloses that the above-described electronic device may be a "PDA, a wireless telephone, a laptop PC, a pen-based computer, or any other electronic system to which it is desired to input data" (see column 8, lines 29-33). It is consequently understood that this electronic device may be a wireless communicator providing wireless web browsing functionality, as is well-known in the art. The above-described teachings of Montellese, which may be implemented on such an electronic device, particularly entails a projector, a two dimensional sensor, and alpha-numeric information generation circuitry, like that described in claim 36, and which projects an image of a keyboard onto a surface, senses user interaction with specific locations of the projected keyboard image, and generates an alpha-numeric output that may be useful in web browsing, like recited in claim 66. Such an electronic device, implementing the teachings of Montellese, is therefore considered a wireless system like that recited in claims 36, and is considered to teach a method like that recited in claim 66.

Regarding claims 41 and 71, Rafii discloses that the above-described electronic device may be a "PDA, a wireless telephone, a laptop PC, a pen-based computer, or any other electronic system to which it is desired to input data" (see column 8, lines 29-33), and that the user may input e-mail into the computer system (see column 8, lines 45-49). It is consequently understood that this electronic device may be a wireless communicator providing email communication functionality, as is well known in the art. The above-described teachings of Montellese, which may be implemented on such a device, particularly entails a projector, a two-dimensional sensor, and alpha-numeric information generation circuitry, like that described in claim 41, and which

projects an image of a keyboard onto a surface, senses user interaction with specific locations of the projected keyboard image, and generates an alpha-numeric output that may be useful in web browsing, like recited in claim 71. Such a companion computer system, implementing the teachings of Montellese, is therefore considered a wireless system, like that recited in claim 41, and is considered to teach a method, like that recited in claim 71.

Regarding claims 46 and 76, Rafii discloses that the above-described electronic device may be a "PDA, a wireless telephone, a laptop PC, a pen-based computer, or any other electronic system to which it is desired to input data" (see column 8, lines 29-33). It is consequently understood that this electronic device may be a wireless communicator providing mobile commerce communication functionality, as is well-known in the art. The above-described teachings of Montellese, which may be implemented on such a device, particularly entails a projector, a two dimensional sensor, and alpha-numeric information generation circuitry, like that described in claim 46, and which projects an image of a keyboard onto a surface, senses user interaction with specific locations of the projected keyboard image, and generates an alpha-numeric output that may be useful in web browsing, like recited in claim 76. Such an electronic device, implementing the teachings of Montellese, is therefore considered a wireless system like that recited in claim 46, and is considered to teach a method like that recited in claim 76.

Claims 14-15, 30-31, and 62-63 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Montellese and Rafii, which is described above, and also over U.S. Patent No. 6,435,682, which is attributed to Kaelin et al. (and hereafter referred to as "Kaelin"). As shown above, Montellese and Rafii presents a companion computer system,

which like the apparatus recited in claim 1, comprises a projector for projecting an image of a keyboard onto an inert surface. Neither Rafii nor Montellese, however, go into great detail in describing this projector, only disclosing that it comprises a laser or other light source, and a lens upon which is etched a diffractive pattern to serve as a mask (for example, see column 10, lines 41-56 of Rafii). Consequently, Montellese and Rafii do not explicitly disclose that the projector comprises a mirror directing light passing through the mask onto an inert surface, as is recited in claim 14, or that the projector comprises a lens directing light from the light source through the mask, as is recited in claim 15. Rafii and Montellese also do not disclose that the projector comprises a spatial light modulator, like expressed in each of claims 31-31 and 62-63.

Kaelin complements the teachings of Montellese and Rafii, detailing a projector system used to project images onto an inert surface (see column 1, lines 48-59). Specifically like Montellese and Rafii, Kaelin discloses that such an image projector system comprises a point light source, such as a laser, which illuminates a mask provided by a spatial light modulator in order to produce an image onto an inert surface (see column 2, lines 38-54; and column 3, line 38 – column 4, line 3). Regarding the claimed invention, the image projector system of Kaelin comprises a mirror, to direct light passing through the mask onto the inert surface (see column 3, lines 30-37), and a lens, to direct light from the light source through the mask (see column 4, lines 27-39).

It would have been obvious to one of ordinary skill in the art, having the teachings of Montellese, Rafii, and Kaelin before him at the time the invention was made, to modify the electronic device taught by Montellese and Rafii to include the projector system of Kaelin in order to project the keyboard image. It would have been advantageous to one of ordinary skill to

utilize such a combination because the projector system of Kaelin requires less energy than conventional projectors, as is taught by Kaelin (for example, see column 5, lines 19-40). An energy efficient projector is beneficial in a small electronic device, such as that taught by Rafii, which normally comprises a limited energy source. Specifically regarding claims 31 and 63, Montellese discloses that the projected keyboard image may dynamically change (for example, see column 3, lines 27-49). Consequently, it is understood that the spatial light modulator of Kaelin, as used to create such a dynamically changing image, is necessarily a dynamic spatial light modulator, like that described in claims 31 and 63, which is responsive to electrical input for producing a dynamic image.

Claims 34, 37, 42, 47, 67, 72, and 77 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Montellese and Rafii, which is described above, and also over U.S. Patent No. 6,266,048, which is attributed to Carau, Sr. (and which is hereafter referred to as "Carau"). As described above, particularly in the rejections for claims 36, 41, 46, 66, 71, and 76, Montellese and Rafii present an electrical device, which may be a wireless communicator providing web browsing functionality, email functionality, and/or mobile commerce communication functionality, and which comprises a projector for projecting an image of a keyboard onto a surface in front of the companion computer system. Neither Montellese nor Rafii, however, explicitly disclose that this projector also projects an image of a display onto the surface, as is recited in each of claims 34, 37, 42, 47, 67, 72, and 77.

Like Montellese and Rafii, Carau presents a means for entering data into a computer system, whereby the computer system comprises a projector for projecting an image onto an

inert surface, and comprises sensors to detect interaction with this image (see column 1, lines 12-36). Specifically regarding the claimed invention, Carau proposes projecting an image of a keyboard and a display (For example, see column 1, lines 56-65).

It would have therefore been obvious to one of ordinary skill in the art, having the teachings of Montellese, Rafii, and Carau before him at the time the invention was made, to modify the electronic device taught by Montellese and Rafii to also project an image of a display, as is done by Carau. It would have been advantageous to one of ordinary skill to utilize such a combination, because projecting a display allows the computer system to be smaller, as is taught by Carau (see column 1, lines 12-36). Regarding the claimed invention, it is understood that this projected display may comprise images produced during web browsing, messages produced during email communication, or images produced during mobile commerce communication, which are common in displays of companion computer systems like those taught by Rafii and Montellese.

Claims 38, 43, 48, 68, 73, and 78 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Montellese, Rafii and Carau, which is described above, and also over U.S. Patent No. 6,593,944, which is attributed to Nicolas et al. (and hereafter referred to as "Nicolas"). Regarding claims 38 and 68, the combination of Montellese, Rafii and Carau presents an electronic device, which like the apparatus and method expressed in claims 37 and 67, respectively, comprises a projector for projecting an image of a keyboard and a display onto a surface, and a sensor for sensing user interaction with the projected keyboard. It is understood that the projected display may particularly comprise images produced during web browsing, a

conventional function of such companion computer systems. Neither Montellese, Rafii, nor Carau, however, explicitly disclose that the sensor senses user interaction with specific locations on this projected display, and that web browsing input circuitry at the output of the sensor provides a web browsing output based on user actuation of locations on the projected display, as is expressed in claims 38 and 68.

Like Montellese, Rafii, and Carau, Nicolas discusses small electronic devices, such as PDAs and cellular phones, and regarding the claimed invention, Nicolas describes the use of such small electronic devices to display and browse web pages (see column 1, line 33 – column 2, line 14). Nicolas particularly teaches that an electronic device may display a web link, whereby in response to detecting user actuation of this web link with a stylus, a web browsing output, specifically a web page, is provided (see column 11, lines 52-67).

Therefore, it would have been obvious to one of ordinary skill in the art, having the teachings of Montellese, Rafii, Carau, and Nicolas before him at the time the invention was made, to modify the electronic device taught by Montellese, Rafii, and Carau, such that the sensors also detect user interaction with the display, as is done by Nicolas. It would have been advantageous to one of ordinary skill to utilize such a combination because, as is demonstrated by Nicolas, the ability to directly interact with the display is useful in particular applications, such as web browsing.

In reference to claims 43, 48, 73, and 78, the above-described electronic device of Montellese, Rafii, Carau, and Nicolas comprises a projector to project a display, and circuitry to output data in response to user actuation of specific locations on the projected display. It is understood that the projected display may comprise images produced during email

communication or mobile commerce communication, which are common functions of such electronic devices. Consequently, it is further understood that the sensor of the electronic device senses user interaction with specific locations on the projected display, and that the circuitry at the output of this sensor may provide a mobile commerce or email communication output based on detected user interaction with specific locations of the projected display.

Claim 81 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Montellese, Rafii, and Kaelin et al., which is described above, and also over U.S. Patent No. 6,424,338, which is attributed to Anderson. As described above, Montellese, Rafii, and Kaelin describe a method for inputting alpha-numeric information into a computer according to claim 1, which involves a projector implementing a solid state light source to illuminate, via a negative lens, a mask which defines an image of an input device, such as a keyboard or a pointer, the projector comprising a mirror which directs light from the mask onto an inert surface. Neither Montellese, Rafii, nor Kaelin, however, does not explicitly disclose that such an input device is a touchpad with a pair of click buttons, as is recited in claim 81. Nevertheless touchpads with click buttons are well known input devices in the art. For example, Anderson presents such a touchpad (for example, see figures 1A, 1B, and 1C). Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Montellese, Rafii, and Kaelin to also project an image of a touchpad, like that taught by Anderson. One would have been motivated to combine such teachings, because touchpads, like a mouse, may be used to input position information to a computer, however, touchpads require less space, as is demonstrated by Anderson.

Claim 82 is rejected over the above described combination of Montellese, Rafii, Kaelin, and Anderson, in addition to U.S. Patent No. 5,182,659, which is attributed to Clay et al. (and hereafter referred to as "Clay"). As described above, Montellese, Rafii, Kaelin, and Anderson teach a project which comprises a solid state light source, namely a diode laser, which illuminates via a negative lens a mask that defines an image of at least part of keyboard and a touchpad. As the projected image does not have any distortions, it is understood that the mask is predistored to compensate for optical distortions in the projection. Neither Montellese nor Anderson, however, explicitly discloses that the diode laser has a natural astigmatism which obviates the need for a condensing lens upstream of the mask, as is claimed. Nevertheless Clay teaches a holographic system which involves a diode laser having a natural astigmatism (for example, see column 2, lines 51-63). Therefore, it would have been obvious to one of ordinary skill in the art, having the teachings of Montellese, Rafii, Kaelin, Anderson, and Clay before him at the time the invention was made to modify the method of Montellese, Rafii, Kaelin, Anderson, and Clay to use a laser with a natural astigmatism, to obviate the need for an upstream condensing lens, as done by Clay, because such a laser is common, as is demonstrated by Clay.

Concerning claim 83, Montellese teaches an infrared illuminator which produces radially directed illumination that necessarily extends over 180 degrees (to cover the projected image), generally in a plane generally parallel to the inert surface on which an image is projected, the radially directed illumination being characterized in that it has a relatively narrow spread in a direction generally perpendicular to the inert surface (for example, see figure 9 of Montellese). Accordingly, it is understood that the infrared illuminator comprises a solid state light source

which directs light via a focusing lens and a mirror onto a cylindrical reflecting element, or a functional equivalent thereto, as is claimed.

As per claim 84, Kaelin teaches using a dynamic mask comprising a dynamic spatial light modulator, as is claimed.

Allowable Subject Matter

Claim 85 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: the prior art provides various examples of projecting an image of an input device onto an inert surface, and detecting user's interaction with the input device. Moreover, the prior art teaches implementing an illuminator which comprises a line light source and which directs light over the inert surface on which the input device image is displayed, the light reflected due to user interaction with the image is detected and used to ascertain any particular user input. The prior art, however, does not explicitly teach an illuminator which comprises a scanning mirror which reflects a line of light produced by the line light source in a direction generally perpendicular to the plane of the inert surface, as is claimed.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Blaine Basom whose telephone number is (571) 272-4044. The examiner can normally be reached on Monday through Friday, from 8:30 am to 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Cabeca can be reached on (571) 272-4048. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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btb

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